REMARKS

Favorable reconsideration and allowance of all pending claims are respectfully requested. For the reasons indicated in detail below, these claims are believed to define patentable subject matter.

Support for the amendments in the claims may be found in the specification of the present application. The hereinabove described amendments are believed to introduce no new matter.

By way of review, the claimed invention provides a process comprising contacting a hydrocarbonaceous stream containing sulfur-oxidated compounds with an adsorbent which selectively adsorbs sulfur-oxidated compounds to produce an adsorbent having adsorbed sulfur-oxidated compounds; contacting the adsorbent having adsorbed sulfur-oxidated compounds with a purge stream to displace interstitial hydrocarbons having a reduced concentration of sulfur-oxidated compounds, contacting the adsorbent having adsorbed sulfur-oxidated compounds with a desorbent to produce a desorbent having sulfur-oxidated compounds and an adsorbent having a reduced content of sulfur-oxidated compounds; contacting the previously regenerated adsorbent with a hydrocarbonaceous stream containing sulfur-oxidated compounds; fractionating the desorbent containing sulfur-oxidated compounds in a split shell fractionation zone to recover a desorbent having a reduced concentration of sulfur-oxidated compounds; fractionating the purge stream in the split shell fractionation zone to recover a purge liquid having a reduced concentration of interstitial hydrocarbons; recovering a hydrocarbonaceous stream containing a reduced concentration of sulfur-oxidated compounds; recycling at least a portion of the desorbent having a reduced concentration of sulfur-oxidated compounds; and recycling at least a portion of the purge liquid having a reduced concentration of interstitial hydrocarbons.

Claims 1-8, 10 and 11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy (US 2002/0009404) in view of Bal (US 6482316).

The Tsybulevskiy reference discloses where a hydrocarbon stream containing sulfoxides is contacted with a zeolite adsorbent to produce a hydrocarbon stream having a reduced concentration of sulfoxides. As stated in the Examiner's Office action, the Tsybulevskiy reference does not disclose where the adsorbent is contacted with a desorbent to produce a desorbent containing the sulfur compounds and an adsorbent having a reduced content of the sulfur compounds, does not disclose where the adsorbent with reduced sulfur is contacted with a hydrocarbon stream containing sulfur and does not disclose fractionating the desorbent containing sulfur compounds to obtain a desorbent with reduced sulfur. However, as the Examiner has stated, the Bal reference discloses desorbing sulfur compounds from an adsorbent and treating the desorbent to remove sulfur from the desorbent. Since claims 1, 2 and 10 have been cancelled and claims 3-8 and 11 have been amended to be dependent upon amended claim 27, the applicants respectfully submit that the hereinabove identified rejection be withdrawn.

Claim 9 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy in view of Bal as applied to claim 1 above, and further in view of Ognisty (US 5755933).

The Tsybulevskiy reference in view of the Bal reference discloses everything in claim 1, according to the Examiner, but fails to disclose where the fractionation step is conducted in a split shell fractionation step. However, the Examiner states that the Ognisty reference discloses a fractionation zone with a vertical partition. A close inspection of the Ognisty reference discloses that, for example in Figure 1, a single feedstock is introduced via line 30 into one side of vertical partition 18 and is stripped to provide a vapor stream upwardly flowing and a heavier boiling range material descends in the stripping zone 22. A "heavy" boiling range material is removed from the distillation column via line 38 and recovered. The upwardly flowing vapor from area 26a passes into the upper end of the distillation column and a portion thereof is removed from the

distillation column via line 44 and ultimately recovered via line 52. Another portion of the vapor from area 26a flows downwardly on the opposite side of the vertical partition and is subsequently recovered as a "light" stream via line 62. This reference teaches that the upwardly flowing vapor and any resulting liquid from area 26 is prevented from re-entering area 26a. In summary, the reference fractionates a single feed stream into a lower boiling fraction and a separate higher boiling fraction.

In marked contrast, with the aid of the drawing, it is disclosed in the present application wherein a diesel boiling range hydrocarbon stream containing sulfur-oxidated compounds is introduced into the process via line 1 and is introduced into adsorption zone 2. A resulting diesel boiling range hydrocarbon stream containing a reduced concentration of sulfur oxidized compounds is removed from adsorption zone 2 via line 3 and an initial portion of this effluent is transported via line 3 and introduced into low sulfur, lower end zone 29 contained in split shell fractionation zone 4 to remove and recover desorbent from a previous regeneration. After the initial flow has been completed by removing sufficient desorbent from a previous regeneration of adsorption zone 2, the diesel boiling range hydrocarbon stream containing a reduced concentration of sulfur-oxidated compounds is transported via lines 3 and 27, and recovered as a low sulfur product. A purge stream containing a purge liquid and transported via line 24 is introduced into adsorption zone 25 which contains adsorbent which is spent and contains sulfur-oxidated compounds. The purge stream sweeps the diesel boiling range hydrocarbons having a reduced concentration of sulfur-oxidated compounds from the void spaces surrounding the spent adsorbent and the resulting admixture of the purge liquid and the diesel boiling range hydrocarbons is removed from adsorption zone 25 via line 26 and introduced into low sulfur, lower end zone 29 contained in split shell fractionation zone 4. The desorbent liquid is carried via line 17 and introduced into adsorption zone 18 which contains spent adsorbent

containing sulfur oxidized compounds. An admixture of desorbent and sulfur oxidized compounds is removed from adsorption zone 18 via line 19 and introduced into high sulfur, lower end zone 28 of split shell fractionation zone 4. A liquid stream containing diesel boiling range hydrocarbons and a high concentration of sulfur-oxidated compounds is removed from high sulfur, lower end zone 28 via line 12 and a portion is removed and recovered via lines 12 and 13, and another portion is carried via lines 12 and 14 and introduced into heat exchanger 15. A resulting heated effluent stream containing liquid and vapor is removed from heat exchanger 15 via line 16 and introduced into high sulfur, lower end zone 28. A liquid hydrocarbonaceous stream containing diesel boiling range hydrocarbons having a low level of sulfur-oxidated compounds is removed from low sulfur, lower end zone 29 via line 5 and at least a portion thereof is recovered via line 7 and another portion is transported via lines 5 and 6, and introduced into heat exchanger 8. A resulting heated effluent stream containing vapor and liquid is removed from heat exchanger 8 via line 9 and introduced into low sulfur, lower end zone 29 of split shell fractionation zone 4. The bottom end of split shell fractionation zone 4 is divided into two compartments by partition 10. A number of fractionation trays are employed in the split shell fractionation zone 4 and are schematically represented by trays 11. A liquid desorbent stream is removed from split shell fractionation zone 4 by line 17 and introduced into adsorption zone 18 as hereinabove described. A vapor stream containing purge material is removed from split shell fractionation zone 4 via line 20 and introduced into heat exchanger 21. A resulting condensed liquid containing purge material is removed from heat exchanger 21 via line 22 and a portion is carried via line 23 and introduced into split shell fractionation zone 4 as reflux and another portion is carried via 24 and introduced into adsorption zone 25 as described hereinabove. When adsorption zone 2 becomes spent, the fresh feed flow to adsorption zone 2 is replaced by a purge stream, the desorbent to adsorption zone 18 is replaced by a fresh feed flow and the purge stream to adsorption zone 25 is replaced by a desorbent stream. When adsorption zone 18

becomes spent, the fresh feed flow to adsorption zone 18 is replaced by a purge stream, the desorbent to adsorption zone 25 is replaced by a fresh feed flow and the purge stream to adsorption zone 2 is replaced by a desorbent stream. When adsorption zone 25 becomes spent, the fresh feed to adsorption zone 25 is replaced by a purge stream, the desorbent to adsorption zone 2 is replaced by a fresh feed flow and the purge stream to adsorbent zone 18 is replaced by a desorbent stream.

Therefore, based upon the differences and marked contrasts hereinabove described, the applicants respectfully submit that a person skilled in the art would have no incentive to modify the process of Tsybulevskiy in view of Bal with the teachings of the Ognisty reference. In addition, the Examiner has stated that the fractionation zone of the Ognisty reference allows for pre-stripping of the feed. Based upon the disclosure in the present application, the applicants assert that the Examiner's characterization of the present invention is not correct.

Claims 12-19 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy in view of Bal and Wessels (US4354929).

Since claims 12-19, 21 and 22 are cancelled and claims 23 and 24 are now dependent on amended claim 27, the applicants respectfully request that this rejection be withdrawn.

Claims 20, 25 and 26 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy in view of Bal and Wessels as applied to claim 12 above, and further in view of Ognisty (US 5755933). Since claims 20, 25 and 26 have been cancelled, the applicants respectfully request that this rejection be withdrawn.

Claim 27 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy in view of Bal and Wessels.

The Wessels reference discloses US 3422005 which patent in turn discloses a process wherein a gas oil having 16 to 25 carbon atoms per molecule,

kerosene having 10 to 15 carbon atoms or a mixture thereof is introduced into an adsorption zone selected for the adsorption of normal paraffins from the feedstock. After the normal hydrocarbons are adsorbed on the adsorbent, a cocurrent purge with normal hexane is used to sweep out void and spare vapor containing a high concentration of non-adsorbable components, that is, non-normal hydrocarbons from the effluent of the bed. It is also to be noted that the hydrocarbon feed to the adsorption zone is in the vapor phase. After the cocurrent purge with normal hexane is completed, a countercurrent purge with normal hexane is utilized to desorb normal paraffin hydrocarbons from the adsorbent bed. The effluent removed from the effluent end of the bed is cooled and passed to a non-normal dehexanizer column from which non-normal hydrocarbons are withdrawn as a liquid bottoms product. The effluent removed from the feed end of the bed is cooled and passed to a normal paraffin dehexanizer column from which normal paraffin bottoms are withdrawn. The normal hexane discharged as overhead from both columns is transferred to storage and is recycled.

In marked contrast, the process of the present invention teaches that the purge stream and the desorbent stream are separate and distinct and have different compositions. In other words, the purge stream is not a desorbent and the desorbent stream is not a purge stream. In addition, the present invention utilizes a single fractionation zone to prepare the purge stream and the desorbent stream for recycle to a spent adsorption zone. Even with the teaching of the use of a purge stream in the prior art, the applicants respectfully submit that a person skilled in the art would have no incentive or ability to utilize the Wessels reference to arrive at the integrated flowscheme of the present invention. In fact, if an artisan were to utilize the complete concept disclosed in the Wessels reference, it is respectfully submitted that the artisan would be lead away from the process of the present invention. Therefore, based upon the hereinabove discussion, the applicants respectfully submit that none of the cited references

either singly or in combination disclose, teach or suggest the process of the present invention.

The fact that individual components can be found in the prior art and rearranged with the benefit of hindsight to provide the benefits of the present invention is not a proper basis for an obviousness rejection. There must be something more in the art to suggest the modification of the cited references than obtaining the benefit that the applicant has discovered. One of ordinary skill in the art would not know the advantages which have been discovered by the applicant and described in the specification of the present application. The mere application of broad principles or goals is insufficient to provide the missing motivation or suggestion to a *prima facie* case. Moreover, widely known and simple components when integrated into a beneficial invention are not obvious despite the ease with which the components may be integrated if one skilled in the art recognized the benefit of the integrations.

The applicants respectfully submit that the Examiner has cited no prior art references, either alone or in combination which disclose, teach or suggest the essential features of the present invention. In view of the hereinabove discussion, it is respectfully submitted that all of the pending amended claims are allowable over 35 U.S.C. 103 and that the application is in condition for allowance. Favorable reconsideration and allowance of the pending claims are therefore courteously solicited.

Respectfully submitted,
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